Applicants first thank Primary Examiner Weier and Supervisory Primary Patent Examiner Cano for filling in for Primary Examiner Sherrer at an interview with undersigned and Dr. Mushkin, head of the Intellectual Property Department of the assignee, during an interview on March 6, 2001, Examiner Sherrer having been ill on that day. Points raised during such interview will be addressed below so that the record will be as complete as possible.

The present application is a CIP of an earlier application, which is a CIP of a yet earlier application, and which is a CIP of a still earlier application, i.e. the present application is the fourth in a series. The present invention is highly important, and involves a commercially successful product. Very briefly, the present invention constitutes an improvement because the lycopene product produced, the subject matter of claim 1, is largely protected from oxidation by the chromoplast shells or capsules, only a small fraction of which are broken (page 7, lines 10-12). Because of the retention of the chromoplast capsule or shell, with the lycopene crystals therewithin, color intensity is maintained due to decreased oxidation. Applicants address this matter additionally below.

First, however, applicants respectfully request withdrawal of the finality of the first action final

rejection. As indicated above, the present application is a CIP with at least some claims having been originally presented in this application which were never previously considered by the PTO. Applicants deserve to have a first action which is not made final on this basis alone. Moreover, there are additional mitigating factors which favor the withdrawal of the finality of the first action, namely the earlier applications were handled by other U.S. patent attorneys, and Dr. Mushkin is newly appointed as the head of the intellectual property department of the assignee, i.e. this is our first opportunity to deal with this case, and we should have an opportunity to amend the claims as a matter of right.

Accordingly, applicants respectfully request withdrawal of the finality of the first action so that the above amendments can be entered as a matter of right. Of course, applicants also request allowance; however, if the application is not yet in condition for allowance, applicants hope for the opportunity of a further Office Action.

Before addressing the rejections of record specifically, applicants wish to respectfully note the general rule that what an applicant states in his or her specification is to be accepted by the PTO in the absence of evidence or good reasoning to the contrary. The present applicants submit and believe that there is no evidence or good reasoning which

is contrary to what is stated in applicants' specification as regards the improved results achieved by the present invention. Applicants wish to quote briefly from several parts of applicants' specification. Thus, from the background section of applicants' specification at page 1:

> In general, ... use [of natural coloring material for the orange-yellow color range] is very expensive since their coloring potency is inferior to that of synthetic colorance. Furthermore, many natural colors are pH-dependent and thus change their color after incorporation within food products as a result of pH changes, or due to oxidation in air, and are often readily destroyed by moderate heat.

Heating is therefore disadvantageous. This problem exists with regard to lycopene. From page 2 of applicants' specification:

> Lycopene is the compound which imparts the bright red color to these fruits [e.g. tomatoes], but conventional methods of extraction destroy the crystalline structure of this pigment, thus altering its red color to orange-yellow, similar to the color obtainable with β-carotene.

The problem with conventionally extracted lycopene is that its exposure to oxygen causes it to lose its bright red color. In spec?

The present invention solves the problem. From the top of page 7 of applicants' specification:

> Naturally occurring chromoplasts present in fruits are small natural double-membrane capsules. Chromoplasts present in lycopene-rich fruit, such as tomato, contain lycopene in crystalline form, and in varying concentrations and crystal sizes. Upon breakage and fractionation of tomato fruit into soluble and insoluble fractions, the chromoplasts are found in the insoluble fraction in concentrated form. The intense red color of lycopene is absolutely dependent on its intact crystalline structure; hence it is likely that keeping the lycopene associated with the chromoplasts, either intact or partially broken, is instrumental in maintaining the red color. That is, the crystalline structure of lycopene is more readily preserved therein, and is not destroyed or otherwise changed, as occurs with rigorous extraction of the chromoplasts.

huh? intact or not?

A key aspect of the present invention therefor is to liberate the chromoplast from the fruit without causing substantial mechanical breakage or destruction of the chromoplast membrane. This is summarized at the bottom of page 6 of applicants' specification as follows:

> The coloring material of the invention comprises, as the color-imparting agent, intact and partially broken chromoplast particles containing crystalline lycopene, separated from the fruit which contained them, and from the bulk of the flavor-imparting components of the fruit. Said chromoplast particles containing crystalline lycopene also comprise a neutraceutical, natural lycopene being an effective antioxidant, useful for promoting and maintaining human health.

And at the end of the first paragraph on page 7:

> Additionally, the chromoplast particles containing crystalline lycopene, separated from the fruit which contained them, have been found to be relatively insensitive to the effects of heat and oxidation, which strongly and adversely affect pure lycopene.

Applicants explained the above during the aforementioned interview, and moreover presented amendments to the claims above to place the claims in better form consistent with U.S. practice. Applicants believe that the amendments presented above are "cosmetic" and are not narrowing amendments; no limitations have been added and none are intended.

Acknowledgement by the PTO of the receipt of applicants papers filed under Section 119 is noted.

Claims 29-40 have been withdrawn from further consideration as being directed to subject matter which is deemed by the PTO to be patentably distinct from the subject matter of claims 1-28. If the other claims are deemed allowable, then the non-elected claims may be deleted (without, of course, prejudice to applicants' rights to proceed with a divisional application, without penalty, relying on Sections 121, 120 and 119) by Examiner's Amendment.

Claims 1-25 and 28 have been rejected as anticipated by Graves '095. This rejection is respectfully traversed.

Graves, which is acknowledged prior art and is discussed in the top paragraph on page 4 of applicants' specification, is antithetical to the present invention. In this regard, Graves states as follows at column 3, lines 16-19:

> Disruption of the cell structure of the carotenoid source during separation generally inherently results in transfer of the carotenoid(s) in the carotenoid source from the pulp fraction to the liquid fraction.

This disruption of the cell structure, i.e. destruction of the chromoplast membrane, is exactly what applicant wish to and have substantially avoided, and what gives applicants' product improved resistance to oxidation and resistance to loss of the deep red color. This is clear from the original language of claim 1 and is even more clear from the amended language of claim 1.

Graves clearly does not disclose (and therefore does not anticipate) a coloring material of lycopene-containing chromoplast particles, let alone such a composition comprising 500-3,000 ppm thereof wherein the material has a soluble solids concentration below 5° Bx.

The rejection should be withdrawn and such is respectfully requested.

Claims 1-3, 5, 17 and 23 have been rejected as anticipated by Iwatsuki. This rejection is respectfully traversed.

In certain respects, Iwatsuki is the closest reference, because it is the **only** reference in which intact chromoplasts are disclosed. However, the Iwatsuki abstract is very clear in the first sentence that the intact chromoplasts "were isolated...", and in the second sentence that the "isolated chromoplast fractions were contaminated very little by other organelles... .". The term "isolated" makes it very clear that what Iwatsuki et al obtained was substantially **only** the chromoplasts. But that is not what applicants are claiming.

Thus, contrary to what is disclosed by Iwatsuki, applicants' coloring material comprises from 500 to 3,000 parts per million of lycopene (encapsulated within the chromoplast particles), a far cry from isolated chromoplasts. Moreover, applicants' claimed coloring material has a soluble solids concentration below 5° Bx.

Accordingly, in spite of the fact that Iwatsuki discloses isolated intact chromoplasts, Iwatsuki does not disclose applicants' claimed subject matter.

Applicants respectfully request that this rejection be withdrawn.

Claims 1-3, 5, 14 and 17 have been rejected as anticipated by Tonnuci. Claims 8, 9 and 11 have been rejected as anticipated by Dale. Claims 1-3, 5-7 and 15-22 have been rejected as anticipated by Brumlick. Claims 1-3, 5, 6 and 13-22 have been rejected as anticipated by Szabo. Claims 1-5 and 14-20 have been rejected as anticipated by Bradley. And claims 1-5, 7 and 13-22 have been rejected as anticipated by Lang. These rejections are respectfully traversed.

All of these references relate to the manufacture of condensed tomato products and in applicants' view are roughly equivalent or substantially cumulative, i.e. they relate to generally the same subject matter corresponding to acknowledged prior art. For example, Szabo '505, Bradley '281, Lang '160 and Brumlick '743 are all mentioned in the top paragraph on page 5 of applicants' specification. Moreover, the middle paragraph on page 4 of applicants' specification acknowledges that tomato paste and concentrates have been made in the prior art, and applicants' specification states as follows in this regard:

> Many processes are also known in the art for producing tomato pastes and concentrates, products which do indeed contain high concentrations of lycopene. However, these products also contain high concentrations of those tomato components which contribute aroma, viscosity and flavor to the final product. These latter properties are contributed by the soluble solids present in tomato. In the tomato, soluble solids

> constitute about 5% by weight of the whole fruit. The insoluble solids, which include the lycopene-containing chromoplasts, constitute about 1% of the weight of the fruit, while the remaining 94% is contributed by water. In the production of tomato paste, only water is removed, thus increasing the concentrations of both the soluble and insoluble solids by the same ratio.

Applicants again respectfully note that what an applicant states in his specification is to be accepted in the absence of evidence or good reasoning to the contrary. Here, what applicants state is fully consistent with common knowledge, e.g. tomato concentrates have the aroma and flavor of concentrated tomato, undesirable in the present invention.

Moreover, it should also be abundantly clear that when product such as tomato sauce, tomato paste and tomato puree are made, only water is removed as above stated, "thus increasing the concentrations of both the soluble and insoluble solids by the same ratio".

Applicants' specification continues in this regard in the bottom paragraph on page 4 as follows:

> In the field of food technology, the soluble solids content of foods is frequently reported in degrees Brix, (°Bx) which is a measurement of the light refraction of the dissolved solids, expressed as sucrose. While a native whole tomato contains approximately 5° Bx of soluble solids, commercially available tomato pastes contain about 30° Bx. Similarly, while a native

> whole tomato typically contains approximately 70 ppm lycopene, commercially available tomato pastes contain approximately 350 to 400 ppm lycopene. Hence, while tomato paste is enriched about 6-fold in lycopene concentration, taking into consideration losses incurred upon processing, tomato paste is also enriched about 6-fold in the concentration of the components which contribute tomato flavor.

This is basically what the aforementioned citations show. In addition, the process of making these tomato products causes destruction of the chromoplast membrane.

Tonnuci involves a study of commercially processed tomato-based food products (last paragraph on first page). Table 2 on page 583 shows the lycopene content of various tomato based products including tomato soup, tomato juice and vegetable juice; and Table 3 on the following page shows the lycopene content of catsup, spaghetti sauce, tomato paste, tomato puree and tomato sauce. These were all commercial products, and of course there is no indication as to how these were prepared, whereby one must assume they were prepared in the conventional way by the use of heat (which destroys the chromoplast membrane) and the maceration of the tomato.

In addition, it is furthermore absolutely clear that even though one or more of the products tested by Tonnuci et al may contain 350-400 ppm of lycopene, the Brix value conclusively must be well above 5°. And it is worth repeating

that the heating and maceration typically used to make tomato based food products results in disruption of the chromoplasts membrane, contrary to the present invention.

Bradley is quite specific as to what happens to the cellular structure during these conventional treatments. Bradley states at column 5, commencing at line 44 as follows:

> Secondly, the mechanical separation procedure of the prior art, i.e., high speed centrifugal separation, unavoidably degrades the cellular structure of the tomato macerate, causing fragmentation of cellular and fibrous structural material.

However, Bradley uses heat to inactivate enzymes, e.g. note column 3, lines 4-7 and 25-30, as well as the sole example (column 9). Thus, Bradley also inevitably disrupts the membrane of the chromoplast.

The abstract of Dale expressly mentions the use of "a heat treatment", and this is well illustrated in the Abstract of publication.

Brumlick involves distilling steps and toasting steps (e.g. Fig. 1; column 2, lines 57-61; column 3, line 4; and the examples), i.e. high heat, destructive of the chromoplast membrane.

Szabo discloses a hot breaking process, and specifically mentions at column 1, lines 13-16 that the "colloidal particles ... undergoes certain transformations due

to the effect of the heat, ..." Evaporation is carried out on the serum-fraction as mentioned in the paragraph spanning columns 3 and 4.

Lang heats to at least 65°C, noting for example the abstract, and mentions near the top of column 2 that it "is known that temperatures of 70°-75°C will denature polygalacturonase in tomatoes".

The references clearly carry out steps, especially heating steps, which will inevitably rupture the chromoplast membrane and release the lycopene so that what results is not in accordance with the present invention. The rejections based on Section 102 should be withdrawn, and such is respectfully requested.

Claims 26 and 27 have been rejected as obvious under Section 103 from Graves in view of Horn. This rejection is respectfully traversed.

The statement of this rejection appears in an Office Action mailed March 25, 1998, in application 08/507,632, at pages 6 and 7. As understood, Horn is relied upon to "teach the prior art use of a colloid mill to reduce the size of carotenoids to increase their solubility". The rejection states that it "would have been obvious to those of ordinary skill in the art to use the colloid mill of the prior art, as

taught by Horn et al, in the process of Graves et al for its intended and well taught use." However, this would in no way lead to the present invention, even if such a combination were obvious. The addition of Horn to Graves does not do away with the teaching of Graves to disrupt the cell structure of the carotenoid.

Nowhere in the prior art is it taught that one should try to **not** disrupt the chromoplasts membrane, which is a key aspect of applicants' invention. Accordingly, even if the combination were obvious, it would not lead to the present invention. Applicants request that this rejection be withdrawn.

Claims 1-5, 7 and 13-22 have been rejected as obvious under Section 103 from Lang in view of Brumlick. This rejection is respectfully traversed.

The statement of this rejection appears at pages 8 and 9 of the Office Action of August 20, 1996, in application 08/507,632. Both Lang and Brumlick have been discussed above, where it is pointed out that they are substantially cumulative from applicants' viewpoint. Even if it were obvious to combine them as proposed, the results of such a combination would not correspond to applicants' claimed subject matter. Applicants accordingly respectfully request that this rejection be withdrawn.

Claims 4, 6-13, 15, 16 and 18-28 have been rejected as obvious under Section 103 from Tonucci in view of Dale. This rejection is respectfully traversed.

The statement of this rejection appears at pages 6 and 7 of the Office Action of April 7, 1997, in application 08/507,632. As pointed out above, both Tonucci and Dale are directed to the same general subject matter, i.e. tomato concentrates of one type or another. They both lack key features of the present invention as pointed out above, and any possible combination of the two, even if obvious, could not possibly result in applicants' claimed subject matter.

Applicants respectfully request that this rejection be withdrawn.

Applicants respectfully reiterate that there is nothing in the prior art leading toward the present invention. There is no recognition in any of the cited references of the need to refrain from rupturing the membrane of the chromoplasts to the greatest extent possible, or that such an expedient will result in an improved coloring product. The only reference which deals with intact chromoplast is Iwatsuki, and Iwatsuki only shows isolated chromoplasts, and does not show a coloring material containing 500 to 3000 ppm of the chromoplast particles encapsulating crystalline lycopene.

Favorable reconsideration and allowance are earnestly solicited.

Respectfully submitted,

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Version with Markings to Show Changes Made

1. (Amended) A coloring material in the red color range comprising, as the color-imparting agent, chromoplast particles ~~comprising~~ encapsulating crystalline lycopene, said chromoplast particles being particles separated from a fruit which contained them, and

wherein the coloring material comprises from 500 to 3000 ppm of said chromoplast particles encapsulating crystalline lycopene, and wherein the chromoplast particles are substantially intact, and wherein the coloring material has a soluble solids concentration below 5° Bx.

8. (Amended) A process for preparing a coloring material comprising as a color-imparting agent chromoplast particles containing crystalline lycopene, comprising ~~the steps of~~:

a) selecting and pre-treating a lycopene-containing fruit by cleaning it;

b) breaking the fruit;

c) screening out solid components above a predetermined dimension; and

d) separating by centrifugation a fruit serum from a material thus obtained, wherein said process is carried out under conditions providing said chromoplast particles

containing crystalline lycopene such that the chromoplasts are substantially intact, thereby obtaining a color concentrate comprising the said color-imparting agent:

wherein the coloring material comprises from 500 to 3000 ppm of lycopene and wherein the material has a soluble solids concentration below 5° Bx.

24. (Amended) A process for coloring a food product~~s~~ which comprises ~~the steps of;~~:

a) cleaning and breaking tomatoes which comprise chromoplasts containing lycopene in the amount of at least 120 ppm;

b) screening out solid components therefrom of a predetermined size; and

c) separating a serum from a screened tomato material by centrifugation, wherein said process is carried out under conditions providing said chromoplast particles containing crystalline lycopene such that the chromoplasts are substantially intact, thereby to obtain a color concentrate comprising said chromoplasts containing crystalline lycopene in a concentration from 500 to 3000 ppm and introducing said concentrate into said food products.

29. (Amended) A neutraceutical in the red color range, comprising, as the active ingredient, chromoplast

particles ~~comprising~~ encapsulating crystalline lycopene, said chromoplast particles being particles separated from a fruit which contains them, and

wherein the neutraceutical comprises from 500 to 3000 ppm of said chromoplast particles encapsulating lycopene and wherein the chromoplast particles are substantially intact, and wherein the material has a soluble solids concentration below 5° Brix and a carrier.

35. (Amended) A process for preparing a neutraceutical composition comprising as the neutraceutical active ingredient, chromoplast particles containing crystalline lycopene, comprising ~~the steps of.~~:

a) selecting and pre-treating a lycopene-containing fruit by cleaning it;

b) breaking the fruit;

c) screening out solid components above a predetermined dimension~~,~~; and~~;~~

d) separating by centrifugation, a fruit serum from the material thus obtained, wherein said process is carried out under conditions providing said chromoplast particles containing crystalline lycopene such that the chromoplasts are substantially intact, thereby obtaining a lycopene concentrate comprising from 500 to 3000 ppm of lycopene and wherein the material has a soluble solids concentration below 5° Brix.